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⑭ A chair back with adjustable lumbar support.

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### Description

The present invention relates to a seat back, especially for an automobile seat, having a frame structure in which a support part is resiliently suspended, said support part having two elongated, preferably rod-like side elements which extend along the seat back and are connected by means of a plurality of transverse connecting members that are held in tension by tensioning members connecting each side element to a respective adjacent side part of the frame structure, a buckling assembly for causing each side element to arch, with the centre region of the arc thus formed facing forward, thereby to form a lumbar support comprising the connecting members extending between the two side elements, and adjusting means for enabling adjustment of the lumbar support by changing the size of said arch.

A seat back of this design is comfortable, because it adapts well the shape of the back of the user. Hitherto, however, it has not been possible with this type of seat back to provide an adjustable lumbar support while retaining the good adaptability or conformability of the seat back. A large number of adjustable lumbar supports of mutually different design are known per se, but a common drawback with these known designs is that the lumbar support is felt as a hard bulge which yields but very slightly.

GB-A-1 536 132 discloses a kind of seat back where two rod-like side elements are connected by a number of transverse connecting members, which are each resiliently suspended in a frame structure. By means of a buckling assembly the two side elements can be arched so as to provide a lumbar support, the arching of which is adjustable.

The object of the invention is to eliminate the drawbacks of known lumbar supports, and to provide an improved seat back having an adjustable, comfortable lumbar support. Another object of the invention is to provide a seat back of simple design.

This is achieved in accordance with the invention, in that the buckling assembly includes tensioning devices connected to the opposite ends of each side element for applying thereto buckling forces which cause the respective side element to arch, said adjusting means being supported by said seat back intermediate of the ends of the side elements for adjusting said tensioning devices in a manner to selectively increase and decrease the buckling forces applied to the opposite ends of said side elements to thereby change the amount of buckling of said side elements. In this way, it is possible to adjust the lumbar support to the form desired, without it being felt that the support becomes harder as the forward projection of the support is increased.

According to one particularly advantageous embodiment of the invention, each tensioning device includes intermediate the ends thereof an engagement means which is cooperating with

5 said adjusting means in a manner such that movement of said adjusting means causes movement of each engaging means in mutually opposite directions therealong. In this way, there is obtained a simple and reliable construction.

The invention will now be described in more detail, with reference to embodiments thereof illustrated in the accompanying drawings, in which

10 Fig. 1 is a side view, partly in section, of a seat back according to the invention,

Fig. 2 is a rear view of the fundamental structure of a seat back according to the invention,

15 Fig. 3 is a sectional view taken on the line III-III in Fig. 2, and

Fig. 4 is a part view, corresponding to Fig. 2, of an alternative embodiment of the invention.

20 In the embodiment illustrated in Fig. 1, a seat back 1 forming part of an automobile seat has a frame structure 2 covered by a moulded body 3. The moulded body 3 has a back-support portion 4, which is located between outwardly projecting side parts 5, which support the user laterally. In turn, the back-support portion 4 is supported by a support member 6 which is suspended in the frame structure 2 and which forms part of a lumbar support 8, the position of which can be adjusted through a regulating means 7. Arranged at the bottom of the seat back 1 are attachment means 9, for connecting the seat back to the seat-part of a chair.

25 As shown in Fig. 2, the support member 6 is provided with two elongated, preferably rod-like side elements 10 and 11, which extend along the seat back and which are connected together by means of a number of transverse connecting members 12. Each of the side elements 10 and 11 is resiliently mounted by means of a number of springs 13, in a respective adjacent side part 14 and 15 of the frame structure 2. In this way, the transverse members 12, which may have the form of wires or straps, are placed under tension.

30 A buckling assembly includes two tensioning devices 16, 17. One of these tensioning devices—device 16—co-acts with the side element 10, while the further tensioning device 17 is arranged to co-act with the other side element 11. Each tensioning device includes an engagement means 18 having extending therefrom connecting members 19, each of said connecting members being connected to a respective end of the side element. The two tensioning devices 16 and 17 are arranged to subject the side elements 10 and 11 to buckling forces of such high magnitude as to cause the elements to arch outwardly, with the centre region of the arc facing forwards (c.f. Figs. 1 and 3), so as to form a lumbar support 8 comprising the transverse members 12 extending between the side elements. The tensioning devices 16 and 17 are arranged to co-act with an adjusting means 20, for changing the extent of the arch formed by the side elements and therewith adjusting the lumbar support (c.f. Fig. 3). The adjusting means 20 includes a rotatable shaft 21, which is located

substantially on a level with the centre regions of the side elements and which is in screw-threaded engagement with the engaging means 18 of each tensioning device. The rotatable adjusting shaft 21 in other words is common to and cooperates with the engaging means 18. The screw threads are such that the two engaging means 18 are moved in opposite directions along the shaft 21, when said shaft is rotated. The regulating means 7 is journaled in a holder 22 on side part 15, and is connected with the adjusting shaft 21 via a twistable connector 23, which permits a certain amount of mutual movement between the regulating means 7 and the adjusting shaft 21. It will be understood that although only one regulating means 7 is shown, the shaft 21 may have such a means on both ends thereof.

Normally, the side elements 10 and 11 are initially pre-arched to a certain extent, and the arch subsequently enlarged to the extent desired. In this respect, it may be suitable, as illustrated in Fig. 3, to attach the uppermost and lowermost springs to each side of the frame structure on the rear side of the side parts thereof, while attaching the intermediate springs to the front side of said side part. In the illustrated embodiment, the springs 13 have the form of tension coil-springs, although it will be understood that other types of spring can be used, in suitable numbers.

Another type of tensioning device 16 is illustrated in Fig. 4. In this embodiment, as distinct from what has previously been described, the engaging means 18 is non-rotatably mounted on the adjusting shaft 21. In this case, the connecting members 19 are so flexible as to be capable of being wound onto and unwound from the engaging means, as the shaft 21 is turned, so as to change the size of the arch. In this embodiment, the engaging means 18 may optionally comprise an actual part of the rotatable shaft 21, and may then suitably be located immediately behind an associated side element. In order to hold the side elements outwardly arched, it is necessary with this embodiment to provide some form of locking means between the holder 22 and the regulating means 7, for example in the form of a friction lock, to prevent accidental rotation of the adjusting shaft 21.

#### Claims

1. A seat back, especially for an automobile seat, having a frame structure (2) in which a support part (6) is resiliently suspended, said support part (6) having two elongated, preferably rod-like side elements (10, 11) which extend along the seat back and are connected by means of a plurality of transverse connecting members (12) that are held in tension by tensioning members (13) connecting each side element (10, 11) to a respective adjacent side part (14, 15) of the frame structure, a buckling assembly for causing each side element to arch, with the centre region of the arc thus formed facing forward, thereby to form a lumbar support (8) comprising the connecting

members (12) extending between the two side elements (10, 11) and adjusting means for enabling adjustment of the lumbar support by changing the size of said arch, characterized in that the buckling assembly includes tensioning devices (16, 17) connected to the opposite ends of each side element for applying thereto buckling forces which cause the respective side element to arch, said adjusting means (20) being supported by said seat back intermediate of the ends of the side elements for adjusting said tensioning devices in a manner to selectively increase and decrease the buckling forces applied to the opposite ends of said side elements to thereby change the amount of buckling of said side elements.

2. A seat back according to claim 1, characterized in that each tensioning device (16, 17) includes intermediate the ends thereof an engagement means (18) which is cooperating with said adjusting means (20) in a manner such that movement of said adjusting means causes movement of each engaging means in mutually opposite directions therealong.

3. A seat back according to claim 2, characterized in that said adjusting means (20) includes a rotatable adjusting shaft (21) common to and cooperating with said engagement means, said shaft extending generally parallel to said transverse connecting members (12) and being located adjacent the central portions of said side elements.

4. A seat back according to claim 3, characterized in that it includes a rotatable knob (7) and associated shaft, said knob shaft being journaled on a side part (15) included in said frame structure (2) and being coaxial with and connected to said rotatable adjustment shaft (21).

5. A seat back according to claim 3, characterized in that said engagement means (18) are in screw-threaded engagement with said adjusting shaft (21), the threads causing said engagement means (18) to move in opposite directions along said adjusting shaft (21) upon rotation of said adjusting shaft.

6. A seat back according to claim 1, characterized in that each tensioning device (16, 17) includes a flexible connecting member (19) which, intermediate its ends is wound around an engagement means (18), and wherein said tensioning devices cooperate with a rotatable adjusting shaft common to both engagement means and extending generally parallel to said transverse connecting members, said engagement means being non-rotatably mounted on said shaft to enable selective winding and unwinding of said flexible connecting member upon rotation of said adjusting shaft.

#### Patentansprüche

1. Rückenlehne, insbesondere für Automobil-sitze, mit einem Rahmen (2), in den bzw. an den ein Stützteil (6) elastisch eingehängt ist, der zwei langgestreckte, insbesondere stabförmige Seitenelmente (10, 11) aufweist, die sich längs

der Rückenlehne erstrecken und mittels einer Anzahl von Querverbindungsorganen (12) verbunden sind, die durch Spannorgane (13) spannbar sind, welche jedes Seitenelement (10, 11) mit einem betreffenden benachbarten Seitenteil (14, 15) des Rahmens (2) verbinden, mit einer Biegeeinrichtung zum Biegen bzw. Wölben jedes Seitenelements (10, 11) derart, daß der zentrale Bereich jeder derart entstandenen Wölbung nach vorn gerichtet ist, wodurch eine Lendenabstützung (8) entsteht, welche sich zwischen zwei Seitenelementen (10, 11) erstreckende Querverbindungsorgane (12) aufweist, und mit einer Einstelleinrichtung (20) zum Einstellen der Lendenstützung (8) durch Ändern der Größe der Wölbung, dadurch gekennzeichnet, daß die Biegeeinrichtung Spanneinrichtungen (16, 17) aufweist, welche die voneinander abgewandten Enden jedes Seitenelements (10, 11) verbindet und zum Biegen bzw. Wölben derselben führende Biegekräfte auf diese ausübt, und daß die Einstelleinrichtung (20) durch die Rückenlehne zwischen den Enden der Seitenelemente (10, 11) zum Einstellen der Spanneinrichtung (16, 17) derart abgestützt ist, daß die auf die voneinander abgewandten Enden der Seitenelemente (10, 11) ausgeübten Biegekräfte wahlweise zu oder abnehmen und hierdurch das Ausmaß des Wölbens bzw. Verbiegens der Seitenelemente (10, 11) änderbar ist.

2. Rückenlehne nach Anspruch 1, dadurch gekennzeichnet, daß jede Spanneinrichtung (16, 17) zwischen deren Enden eine Angriffseinrichtung (18) aufweist, die mit der Einstelleinrichtung (20) derart zusammenwirkt, daß eine Bewegung der Einstelleinrichtung (20) zu einer Bewegung jeder Angriffseinrichtung (18) in wechselseitig entgegengesetzten Richtungen führt.

3. Rückenlehne nach Anspruch 2, dadurch gekennzeichnet, daß die Einstelleinrichtung (20) eine drehbare Einstellwelle (21) aufweist, die Teil der Angriffseinrichtung (18) ist und mit dieser zusammenwirkt, die sich im wesentlichen parallel zu den Querverbindungsorganen (12) erstreckt, und die sich in der Nähe der Zentralbereich jedes Seitenelements (10, 11) befindet.

4. Rückenlehne nach Anspruch 3, gekennzeichnet durch einen Drehgriff (7) und eine zugehörige Welle, die an einem Seitenteil (15) des Rahmens (2) gelagert ist und koaxial mit der drehbaren Einstellwelle (21) verbunden ist.

5. Rückenlehne nach Anspruch 3, dadurch gekennzeichnet, daß die Einstelleinrichtung (18) in Gewindegang mit der Einstellwelle (21) steht und die Gewindegänge die Einstelleinrichtung (18) veranlassen, sich beim Drehen derselben in entgegengesetzten Richtungen längs dieser zu bewegen.

6. Rückenlehne nach Anspruch 1, dadurch gekennzeichnet, daß jede Spanneinrichtung (16, 17) ein biegbare bzw. flexibles Verbindungsorgan (19) aufweist, das zwischen dessen Enden um eine Angriffseinrichtung (18) wickelbar ist, daß die Spanneinrichtungen (16, 17) mit einer drehbaren Einstellwelle (21) zusammenwirken, die beiden Angriffseinrichtungen (18) zugehört und sich

im wesentlichen parallel zu den Querverbindungsorganen (12) erstreckt, und daß die Angriffseinrichtungen (18) drehfest auf der Einstellwelle (21) befestigt sind und beim Drehen derselben wahlweise das Auf- oder Abwickeln der biegbaren bzw. flexiblen Verbindungsorgane (19) erlauben.

#### Revendications

1. Dossier de siège, en particulier pour un siège d'automobile, ayant une structure de cadre (2) dans laquelle une partie de support (6) est suspendue de façon élastique, ladite partie de support (6) ayant deux éléments latéraux (10, 11) allongés, de préférence sous forme de barres qui s'étendent le long du dossier du siège et qui sont, reliés au moyen d'une pluralité de membres de liaison transversaux (12) qui sont maintenus sous tension par des membres tendeurs (13) reliant chaque élément latéral (10, 11) à une partie latérale adjacente respective (14, 15) de la structure de cadre, un ensemble de flexion pour amener chaque élément latéral à former un arc, la région centrale de l'arc ainsi formé étant dirigée vers l'avant, pour former ainsi un support lombaire (8) comprenant les membres de liaison (12) s'étendant entre les deux éléments latéraux (10, 11) et des moyens de réglage pour permettre le réglage du support lombaire en changeant la dimension dudit arc, caractérisé en ce que l'ensemble de flexion comprend des dispositifs tendeurs (16, 17) reliés aux extrémités opposées de chaque élément latéral pour appliquer à celles-ci des forces de flexion qui amènent l'élément latéral respectif (20) à former un arc, ledit moyen de réglage (20) étant supporté par ledit dossier de siège en une position intermédiaire par rapport aux extrémités des éléments latéraux pour régler ledits dispositifs tendeurs de façon à accroître et à décroître sélectivement les forces de flexion appliquées aux extrémités opposées desdits éléments latéraux pour modifier ainsi l'ampleur de flexion desdits éléments latéraux.

2. Dossier de siège selon la revendication 1, caractérisé en ce que chaque dispositif tendeur (16, 17) comprend en une position intermédiaire par rapport aux extrémités de celui-ci un moyen de prise (18) qui coopère avec ledit moyen de réglage (20) de telle façon que le mouvement dudit moyen de réglage provoque le mouvement dudit moyen de prise dans des directions mutuellement opposées le long de celui-ci.

3. Dossier de siège selon la revendication 2, caractérisé en ce que ledit moyen de réglage (20) comprend un arbre de réglage rotatif (21) commun à et coopérant avec ledits moyens de prise, ledit arbre s'étendant généralement parallèlement auxdits membres de liaison transversaux (12) et étant situé en position adjacente par rapport aux parties centrales desdits éléments latéraux.

4. Dossier de siège selon la revendication 3, caractérisé en ce qu'il comprend un bouton rotatif (7) et un arbre associé, ledit arbre à bouton ayant

un toucillon monté sur une partie latérale (15) comprise dans ladite structure de cadre (2) et étant coaxial du et relié audit arbre de réglage rotatif (21).

5. Dossier de siège selon la revendication 3, caractérisé en ce que lesdits moyens de prise (18) sont en prise par filetage avec ledit arbre de réglage (21), les filetages amenant lesdits moyens de prise (18) à se déplacer dans des directions opposées le long dudit arbre de réglage (21) par rotation dudit arbre de réglage.

6. Dossier de siège selon la revendication 1, caractérisé en ce que chaque dispositif tendeur

(16, 17) comprend un membre de liaison flexible (19) qui est enroulé autour d'un moyen de prise (18) en une position intermédiaire par rapport à ses extrémités, et dans lequel lesdits dispositifs tendeurs coopèrent avec un arbre de réglage rotatif commun aux deux moyens de prise et s'étendant généralement parallèlement auxdits membres de liaison transversaux, lesdits moyens de prise étant montés de façon non rotative sur ledit arbre pour permettre l'enroulement et le déroulement sélectifs dudit membre de liaison flexible par rotation dudit arbre de réglage.

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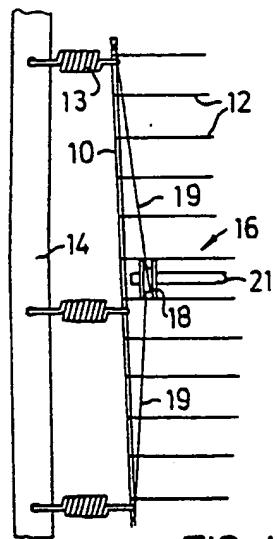
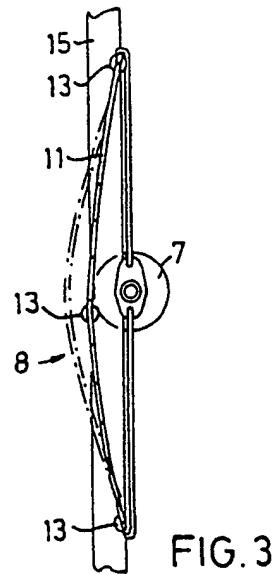
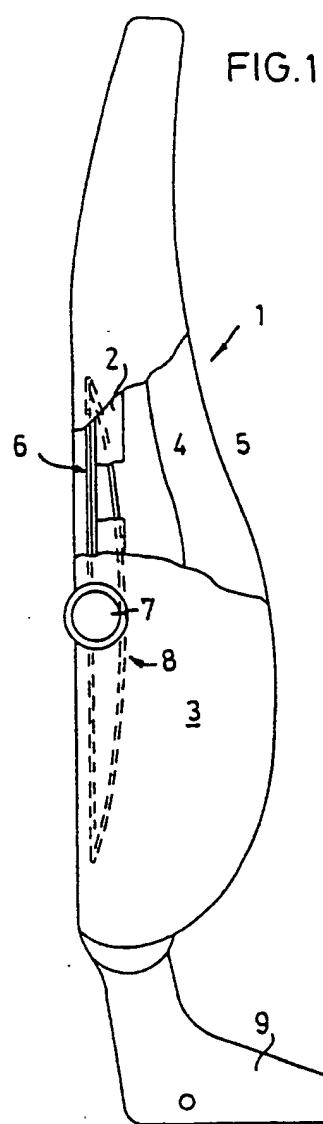
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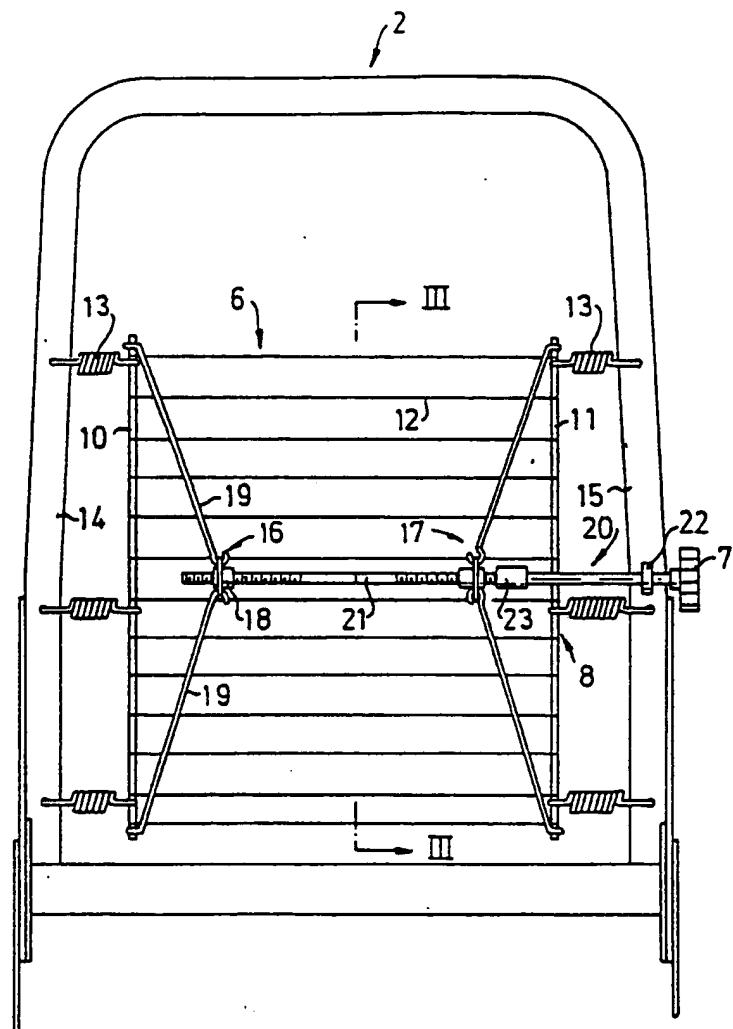


FIG. 2